GREAT LAKES FOREST RESEARCH CENTRE
CENTRE DE RECHERCHE FORESTIÈRE DES GRANDS LACS

Results of forest insect and disease surveys in the NORTH CENTRAL REGION of Ontario, 1984

CARRIED OUT BY THE GREAT LAKES FOREST RESEARCH CENTRE IN COOPERATION WITH THE ONTARIO MINISTRY OF NATURAL RESOURCES

W. D. Biggs and V. Jansons

Miscellaneous Report No. 18

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THE GREAT LAKES FOREST RESEARCH CENTRE

The Great Lakes Forest Research Centre is one of six regional establishments located across Canada and operated by the Canadian Forestry Service. The overall objective of the Service is to promote the preservation, enhancement and wise use of a healthy, attractive and bountiful forest resource and terrestrial environment for the economic and social benefit of all Canadians. The Centre pursues this objective by conducting two major programs: research and technical services and forestry development. Both programs address major problems affecting forest management and the forest environment primarily in Ontario, but because of the transprovincial nature of the forest resource, many elements of our research program are of national significance.

Forestry problems are continually assessed by the Canada-Ontario Joint Forestry Research Committee, made up chiefly of senior members of the Centre and the Ontario Ministry of Natural Resources. The Committee ensures that the research resources of both agencies are effectively transmitted to the forest managers in order to improve forest production and protection, and the quality of the environment.

Staff of the forestry development program negotiate and administer federal-provincial cost-sharing agreements with the province of Ontario, conduct economic studies, and implement job creation programs in the forest sector. Again, this requires close cooperation with the Ontario Ministry of Natural Resources and with other provincial and federal agencies concerned with the forest sector.

Close working relations are also maintained by the Centre with educational institutions specializing in forestry and the biological sciences, with the forest industry, and with other forestry organizations in the province.

The Centre recognizes that forested land must be managed in the best public interest, not only for the wood production essential to our economy but also for the recreational purposes that are so important to our social well-being. These goals must be achieved in a manner that will maintain or improve the quality of the forest environment and preserve it for generations to come.

RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE NORTH CENTRAL REGION OF ONTARIO, 1984

(FOREST DISTRICTS: ATIKOKAN, THUNDER BAY, NIPIGON, GERALDTON AND TERRACE BAY)

W.D. BIGGS AND V. JANSONS

GREAT LAKES FOREST RESEARCH CENTRE

CANADIAN FORESTRY SERVICE

GOVERNMENT OF CANADA

1985

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SURVEY HIGHLIGHTS

This report summarizes information gathered on various pests found in the North Central Region in 1984. The cooperation and assistance provided by the Ontario Ministry of Natural Resources, the various forest industries in the Region, Parks Canada, and the Atmospheric Environment Service are gratefully acknowledged.

The spruce budworm infestation now covers approximately 3,879,896 ha in the Region, a 90% increase over last year. Thunder Bay, Atikokan and Terrace Bay districts had the highest increases in area damaged compared with the damage levels in 1983. Mortality of balsam fir caused by persistent spruce budworm attack now covers 247,060 ha. The jack pine budworm infestation expanded substantially in Atikokan District and to a lesser degree in Thunder Bay District. The infestation size in 1984 was 370,568 ha, and spread is expected to occur in 1985. Forest tent caterpillar populations remained high enough to cause 320 km^2 of damage in the Thunder Bay District; defoliation will probably be present again in 1985. Further decline was observed in the birch skeletonizer infestation. Increased populations of fall webworm and larch sawfly were noted with most of the other major insect populations remaining much the same as they were in 1983.

Late season foliage diseases were more prevalent than they were last year, with a leaf spot on white birch new to the scene. Frost damage was present on aspen in the Atikokan District, and heavy, wet snow caused problems to conifers in parts of the Nipigon District.

This report also summarizes data collected on special surveys of pests in white spruce plantations, and of damage to flowers and cones. Special surveys were also carried out on Hypoxylon canker of aspen and root rot in black spruce. The four jack pine plots established in 1982 were retallied as well.

Two acid rain monitoring plots were established in the Region. Plots were laid out in a black spruce stand in Fowler Township, Thunder Bay District and in a white spruce stand in Wiggins Township, Terrace Bay District.

If further information is required about pest conditions in the North Central Region, please contact the authors or write to the Head, Forest Insect and Disease Survey Unit, Great Lakes Forest Research Centre, P.O. Box 490, Sault Ste. Marie, Ontario, P6A 5M7.

The same format was followed in ranking pests as in previous North Central Region reports:

Frontispiece. Turbo Beaver (Ontario Ministry of Natural Resources) and station wagon - the means of transportation most often used for survey work.

Major Insects or Diseases

capable of causing serious injury to or death of living trees or shrubs

*Minor Insects or Diseases**

capable of sporadic or localized injury but not usually a serious threat to living trees or shrubs

Other Forest Insects/Diseases (Tables)

These tables provide information on two types of pest:

1) those which are of minor importance and have not been known to cause serious damage to forest trees,

2) those which are capable of causing serious damage but, because of low populations or for other reasons, did not cause serious damage in 1984.

*No minor insects or diseases were reported in the North Central Region in 1984.

W.D. Biggs

V. Jansons

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INSECTS

Major Insects

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

For the second consecutive year population levels declined, particularly in the western half of the Region. The heaviest part of the infestation was made up of small pockets of moderate-to-severe damage on white birch (*Betula papyrifera* Marsh.) covering approximately 890 ha in Atikokan and Thunder Bay districts. Damage in the Atikokan District was confined to islands and shorelines on Crowrock, White Otter, Elsie, Sandford and Irene lakes, and in the Thunder Bay District to the west end of Lac des Mille Lacs and two locations at the southeast end of Dog Lake (Fig. 1). The only other reported damage to white birch by this leaf skeletonizer was an area of light-to-moderate defoliation about 100 ha in size in Nakina Township, Geraldton District. Significant browning of foliage was not observed elsewhere in the Region.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Results of damage surveys, population sampling and egg-mass counts of this perennial pest will be published with those of other regions at a later date in a report specifically devoted to this insect. That report wil provide a complete description and analysis of developments in the spruce budworm situation in Ontario in 1984 and will give infestation forecasts for the province for 1985. See photo page for examples of damage caused by the spruce budworm.

Jack Pine Budworm, *Choristoneura pinus pinus* Free.

The area infested by this insect increased dramatically in 1984. In the Atikokan District there was a fiftyfold increase, with moderate-to-severe damage now covering 335,770 ha. The area infested covers the southern section of the Atikokan District or about two-thirds of the part of the district south of Highway 11, including much of Quetico Provincial Park (Fig. 2). Within the Thunder Bay District, where no infestation was present in 1983, approximately 34,798 ha of infested jack pine (*Pinus banksiana* Lamb.) were identified in 1984. The largest area was found in the southwest corner of the district, in the Saganaga and Northern Light lakes area. Individual smaller pockets of moderate-to-severe damage were also observed near Burchell, Shebandowan, Greenwater and Tinto lakes in Thunder Bay District. In many cases the insects seemed to have a preference for stands found on higher shallow soil sites, particularly during the first year of attack. Light populations were found feeding in the male flowers on jack pine at various other points in the two westernmost districts of the Region; elsewhere larvae were not found.

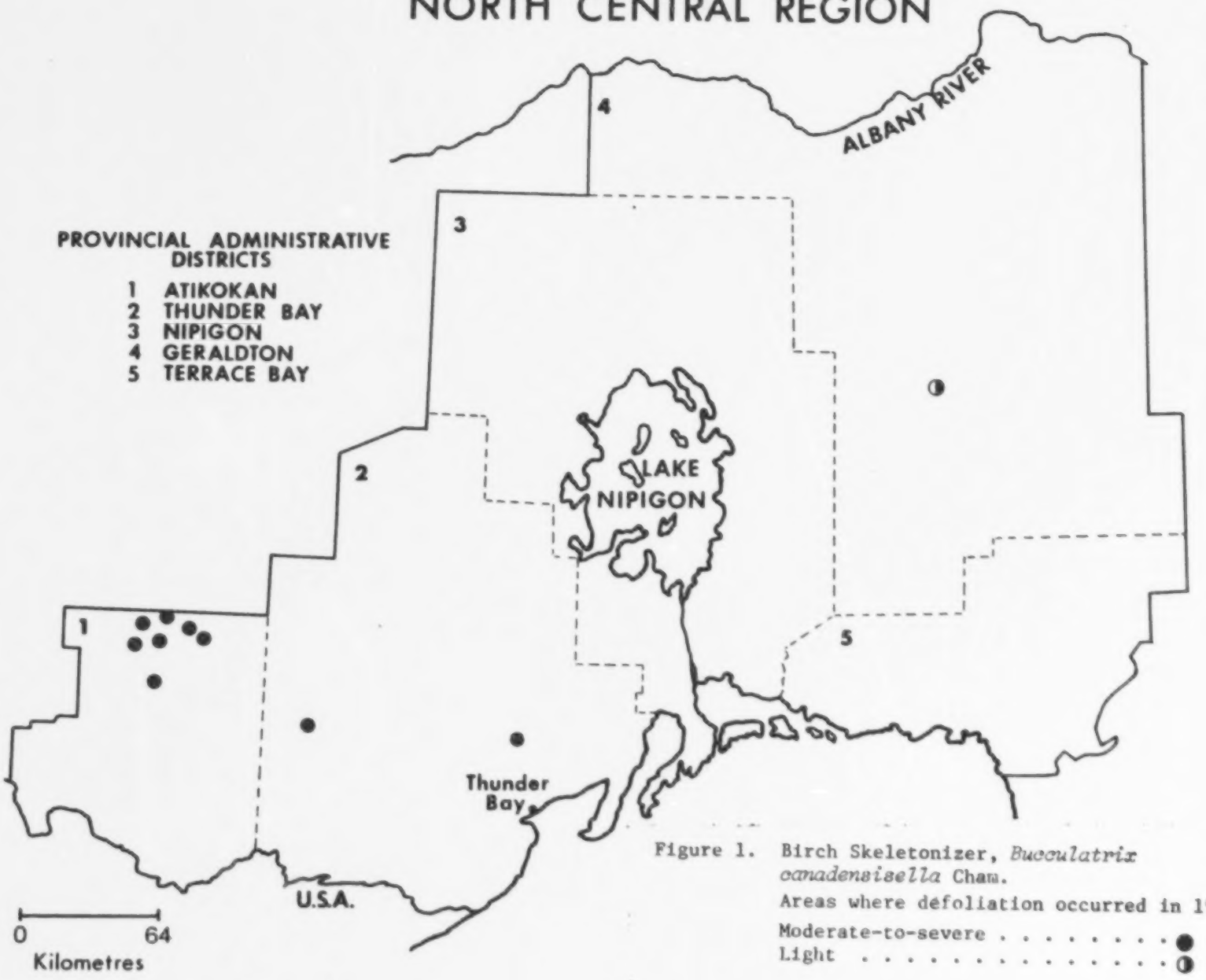


Figure 1. Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

Areas where defoliation occurred in 1984

Moderate-to-severe . . . . . ●

Light . . . . . ◑

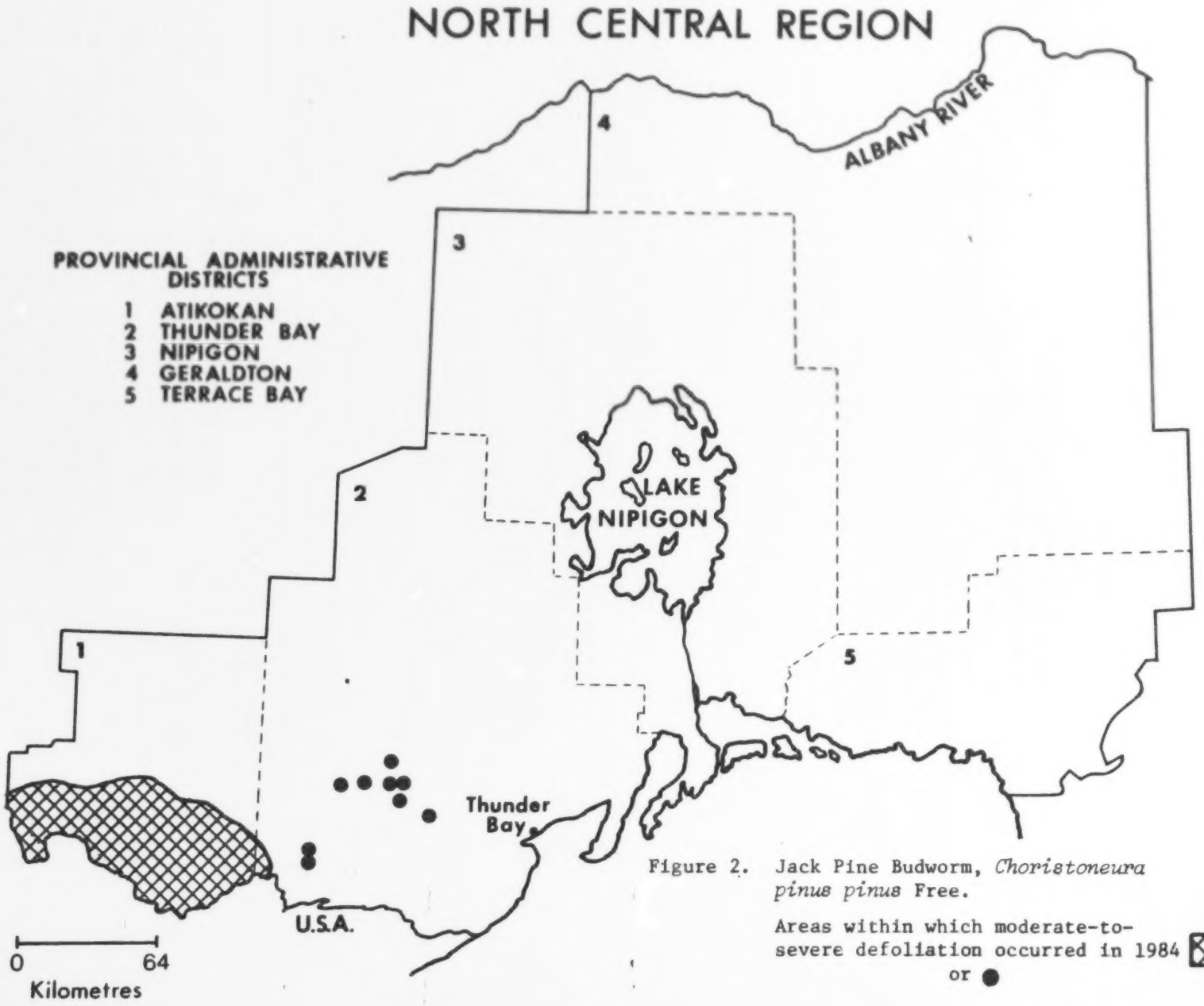
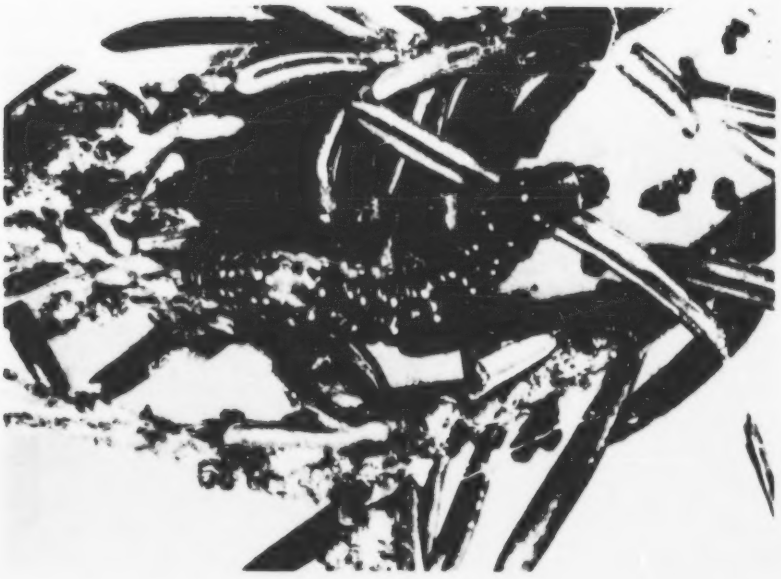


Figure 2. Jack Pine Budworm, *Choristoneura pinus pinus* Free.

Areas within which moderate-to-severe defoliation occurred in 1984 or ●



Mature spruce budworm, *Choristoneura fumiferana* (Clem.) larva

Feeding damage by spruce budworm to the current foliage of a white spruce (*Picea glauca* [Moench] Voss) branch tip

The infestation in the Thunder Bay District may spread and intensify in 1985. Results from egg-mass sampling predict that heavy defoliation will recur in the southwest corner of the district, with light and moderate forecasts, and move northeast to Plummes, Nelson and Squeers lakes area. A high forecast resulted from a sample taken from an infested stand near Upper Shebandowan Lake (Table 1). No eggs were found in samples taken from sites in Hardwick, Ames and Pyramid townships in Thunder Bay District. Major parts of Atikokan District will remain heavily infested in 1985. All the egg-mass sample points located within the 1984 infestation boundary forecast moderate and high infestation for 1985, with the latter category in the majority. Along the Highway 11 corridor to the north of the infestation, forecasts range from light to moderate (Table 1).

Table 1. Jack pine budworm egg-mass counts and defoliation estimates in 1984 and infestation forecasts for 1985 in the Atikokan and Thunder Bay districts (based on the examination of six 61-cm jack pine branches at each location).

Location	Defoliation 1984 (%)	Total no. of egg masses		Infestation forecasts for 1985[a]
		1983	1984	
Atikokan District				
Argo Lake	20	2	11	H
Basswood Lake	90	20	17	H
Burt Lake	51	2	21	H
Cache Bay	15	-	3	M
Harvey Lake	0	-	3	M
Kett Lake	83	13	36	H
Lerome Lake	10	-	2	L
Little Eva Lake	32	-	5	M
Nym Lake	2	-	1	L
Sarah Lake	69	5	13	H
Silence Lake	22	1	14	H
Sunday Lake	19	0	10	H
Thompson Lake	23	-	21	H
Windigoostigwan Lake	2	-	3	M
Thunder Bay District				
Ames Twp	2	-	0	N
Hardwick Twp	0	-	0	N
Nelson Lake	4	-	2	L
Northern Light Lake	6	-	8	H
Plummes Lake	6	-	2	L
Pyramid Twp	0	-	0	N
Squeers Lake	3	-	5	M
Upper Shebandowan Lake	51	-	9	H

[a] N = nil, L = light, M = moderate, H = heavy

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Population levels of this pest, which feeds in conjunction with white pine weevil, *Pissodes strobi* (Peck), remained much the same as they had been in 1983. Detailed observations were at a minimum this year. Observations made while travelling through areas of jack pine regeneration such as the Crooked Pine and Darby lakes areas of Atikokan District, and the Mack Road area of Thunder Bay District, indicate that damage levels remained low in 1984. The pest was found at damaging levels only in the Atikokan and Thunder Bay districts.

Birch Leafminer, *Fenusa pusilla* (Lep.)

In 1984 population levels of this insect declined in the western half of the Region. There was a general decline in both generations of this leafminer, particularly in natural forest stands infested in 1983 in the Atikokan and Thunder Bay districts. The only locations where noteworthy damage was found were within the Thunder Bay city limits, north into Gorham and Ware townships and west to the Kakabeka Falls area, Thunder Bay District. In contrast, high population levels continued, causing conspicuous browning of foliage on ornamental white birch in the urban areas of the towns of Geraldton, Longlac and Marathon. Small pockets of light-to-moderate damage were observed in natural stands at scattered locations along Highway 11 in Nipigon and Geraldton districts and at a few points in the southeastern Terrace Bay District. Light damage was seen at various points along Highway 11/17 between Thunder Bay and Nipigon and at the south end of Highway 527 in Thunder Bay and Nipigon districts.

Fall Webworm, *Hyphantria cunea* (Dru.)

Population levels in the Thunder Bay District were higher in 1984 than in previous years. This pest has rarely reached significant damage levels in this part of the province; high levels were last reported in the Slate River Valley in 1975. This year, damage was not concentrated or heavy on any one stand of shrubs or trees. However, nests were very common through the rural area of the city of Thunder Bay and west into Oliver, Paipoonge, O'Connor and Conmee townships on a variety of hardwood shrubs and tree hosts, most commonly speckled alder (*Alnus rugosa* [Du Roi] Spreng.), cherry (*Prunus* sp.) and white birch. Some ornamental hosts were also infested within the urban part of the city of Thunder Bay. Outside this area, the frequency of colonies diminished rapidly. A small group of roadside shrubs was also infested by about eight colonies at one point along Highway 11 near McCauley Lake in Atikokan District. The only other occurrence of this pest in the Region was one collection in Terrace Bay District.

Gypsy Moth, *Lymantria dispar* (L.)

Pheromone traps designed to attract and catch male moths are being used to monitor the potential spread of this introduced pest into the North Central Region. In cooperation with the Plant Quarantine Division of Agriculture Canada, two traps have been set out in each of the provincial parks in Nipigon, Terrace Bay and Geraldton districts since 1979. In 1984 the same program was started in the Atikokan and Thunder Bay districts, with all provincial parks sampled except Middle Falls. Of the 10 provincial parks sampled in 1984 one recorded a positive catch: two moths were found in one trap at Rainbow Falls Provincial Park in Terrace Bay District. A more intensive trapping program will be carried out in this park in 1985 to determine if there is a resident insect population present at the site.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

The infestation rebounded somewhat and increased in size to cover approximately 320 km^2. The area of moderate-to-severe defoliation was basically in the same part of the Thunder Bay District as it was in 1983, with some expansion east to the Loch Lomond area (Fig. 3). Most of Blake Township was infested with defoliation of trembling aspen (*Populus tremuloides* Michx.), as were parts of Scoble, Pearson and Crooks townships. Very small portions of Gillies and Neebing townships, and Indian Reserve No. 52 were also infested.

This long-standing infestation is expected to recur in 1985. Two egg-band counts within the infestation boundary in Blake and Scoble townships forecast a severe defoliation level for next year. Although the counts were high enough to forecast a severe infestation, extremely high numbers of egg bands were not found, as had been the case in previous years. This difference may indicate a decline in the vigor of the next generation. The only spread expected is to the north of the infestation, with moderate defoliation forecast for Neebing Township and the southeast corner of O'Connor Township (Table 2). No damage is expected in 1985 to the south and west of the present infestation.

Red Pine Sawfly, *Neodiprion nanulus nanulus* Schedl.

For the second consecutive year population levels were high at many points in the western half of the Region. Until last year, population levels had not been this high in this part of Ontario for at least 20 years. Moderate-to-heavy defoliation was observed from the Shebandowan area, east to Shabaqua, and in Stedman, Trewartha and Pyramid townships, Thunder Bay District. Individual overmature jack pine that has overtopped the stand canopy suffered moderate-to-heavy defoliation in Conmee Township and east along Highway 102, in the Dawson Road Lots. This age class is considered most susceptible to attack by this pest.

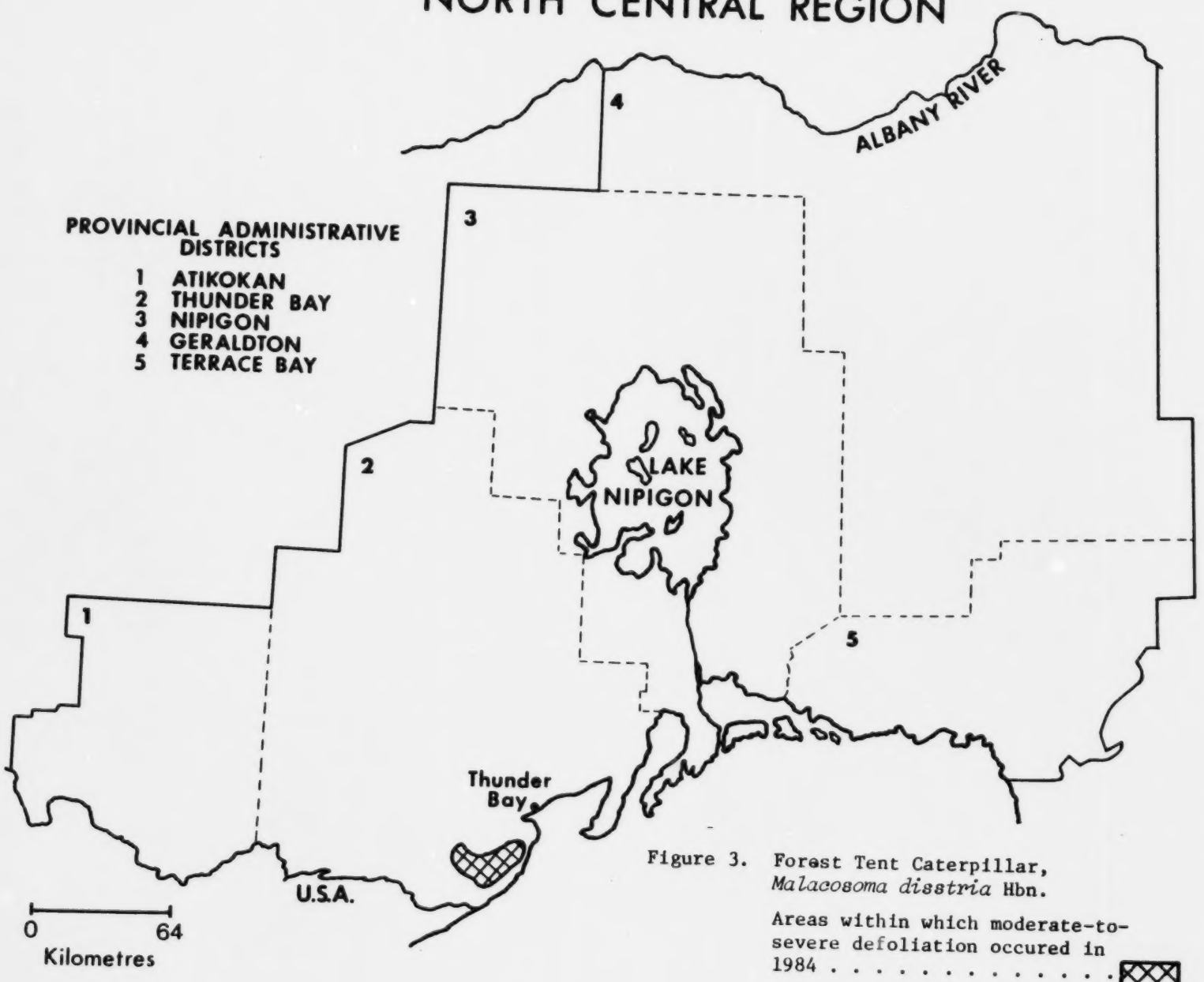


Figure 3. Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Areas within which moderate-to-severe defoliation occured in 1984 . . . . . .

Table 2. A summary of forest tent caterpillar egg-band counts on trembling aspen in Thunder Bay District in 1984, with infestation forecasts for 1985.

Location (Twp)	Avg DBH of trees (cm)	Avg no. of egg bands per tree	Infestation forecast for 1985[a]
Blake	14	12	S
Crooks	14	0	N
Neebing	15	3	M
O'Connor	18	8	M
Pearson	15	0	N
Scoble	14	10	S

[a] N = nil, M = moderate, S = severe

Light-to-moderate levels of feeding on old foliage were seen at many other locations between Shabaqua and English River, in the Matawin Limit, and in the Current River and East Bay areas in Thunder Bay District. Light damage was also seen in a small stand of young jack pine in Lindsley Township, Geraldton District and at various locations in the western part of Atikokan District. Low populations were common at many other points in the Region, such as the Black Sturgeon Lake area and Lapierre Township in Nipigon District.

Yellowheaded Spruce Sawfly, *Pikonema alaskensis* (Roh.)

The high damage levels caused by this insect over the last three years declined in the Region in 1984. Moderate defoliation was observed on white spruce (*Picea glauca* [Moench] Voss) ornamental plantings on the Trans-Canada pipeline right-of-way in Lyon and McTavish townships, Nipigon and Thunder Bay districts, respectively, and also on scattered small trees at Kakabeka Falls Provincial Park, Thunder Bay District, with some of the infested trees heavily damaged. A few heavily damaged black spruce (*Picea mariana* [Mill.] B.S.P.) were observed in a 10-ha young plantation in Davies Township, and at Rainbow Falls Provincial Park, Terrace Bay District. Light defoliation occurred on scattered roadside black spruce along Highway 17 from Shabaqua west to English River, Thunder Bay District and on roadside white spruce at Klotz Lake, Geraldton District. Damage was also observed on ornamental spruce in and around the city of Thunder Bay and other urban areas in the Region.

White Pine Weevil, *Pissodes strobi* (Peck)

There was little change in populations of this insect and widespread light damage continued through the Region in 1984. The highest incidence of damage was recorded in a 16-ha plantation along the Sawmill Bay Road, Thunder Bay District, where 6% of the evaluated jack pine were infested (Table 3). Small, open-grown spruce and jack pine were again weeviled along Highway 17 between Shabaqua and English River, Thunder Bay District, and in Pic and Lecour townships, Terrace Bay District.

In an effort to reduce damage to high-value spruce regeneration, the Ontario Ministry of Natural Resources (OMNR) clipped and disposed of infested leaders in the Limestone Management Unit, Nipigon District and in the Janet Lake plantations, Terrace Bay District.

Table 3. A summary of damage caused by the white pine weevil in four districts in the North Central Region in 1984 (counts based on the examination of 150 trees at each location).

Location	Area affected (ha)	Estimated trees/ha	Host	Avg ht of trees (m)	Leaders attacked (%)
Geraldton District					
Fernow Twp	10	3,000	bS	1.6	0.7
Halfway Rd	10	3,000	jP	1.8	0.7
Kimberly-Clark Rd 15-1	20	3,000	bS	1.5	1.3
Nipigon District					
Limestone Lake	10	3,000	bS	1.9	0
Terrace Bay District					
Davies Twp	20	2,500	bS	1.8	2.0
Thunder Bay District					
Sawmill Bay Rd	16	2,500	jP	2.0	6.0
Hogarth Twp	25	3,000	jP	3.0	5.3

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

Small increases in populations of this insect occurred in the western part of the Region. Scattered 1- to 5-ha pockets of tamarack (*Larix laricina* [Du Roi] K. Koch) suffered 60 to 90% defoliation in Joynt, Upsala and Pyramid townships, Thunder Bay District; along Highway 11 near the Banning Lake Road, Atikokan District; and in Oakes Township, Geraldton District. Moderate-to-severe defoliation recurred in a 6-ha stand of tamarack in McTavish Township, Thunder Bay District, and in a 5-ha tamarack stand in Errington Township, Geraldton District; however, the damage was confined to only 2 ha in each stand this year. Moderate-to-severe damage recurred in a 2-ha stand along Highway 584, south of Murky Creek, Geraldton District, and in a 1-ha stand of young trees in Neebing Township, Thunder Bay District. Light-to-moderate defoliation occurred on scattered trees at the southern end of Highway 527, Thunder Bay District. Elsewhere in the Region populations remained low.

Mountain-ash Sawfly, *Pristiphora geniculata* (Htg.)

No change in populations of this insect was observed in the Region. Moderate-to-severe defoliation of scattered mountain-ash (*Sorbus americana* Marsh.) continued in the Highway 17 area, Terrace Bay District, and in the Upsala area, Thunder Bay District. Light-to-moderate damage was common in Ames Township, and along Highway 17 from Shabaqua to Upsala, Thunder Bay District. Light-to-moderate damage was also observed in the Highway 11 area, Geraldton District, and on ornamental trees in urban areas in the Region. Mountain-ash does not grow in stands; it is found as a very small component of a mixedwood forest, usually as an understory tree.

Table 4. Other forest insects.

Insect	Host(s)	Remarks
Aceria sp. near *dispar* (Nalepa) Aspen leaf mite	tA	low population levels in Blake Twp, Thunder Bay District
Acleris variana (Fern.) Eastern blackheaded budworm	wS, bS, bF	light defoliation in Kimberly-Clark Seed Orchard at Longlac, Geraldton District, where 5% of the cones were damaged on several white spruce trees; low populations in conjunction with spruce budworm at numerous sample points throughout the Region

(continued)

Table 4. Other forest insects (continued).

Insect	Host(s)	Remarks
Actebia fennica (Tausch.) Black army cutworm	wS,bS, jP	low numbers in a few compartments, Thunder Bay Forest Nursery
Conophthorus banksianae McPherson Jack pine tip beetle	jP	small numbers of infested lateral shoots on scattered open-grown 4-m trees at CP 40 Rd, Nipigon District
Dasineura balsamicola (Lintn.) False balsam gall midge	bF	several heavily infested open-grown trees along the Wintering and Catlonite roads, Terrace Bay District
Dioryctria reniculelloides Mut. & Mun. Spruce coneworm	wS	small numbers in conjunction with spruce budworm, Terrace Bay District
Eriocampa ovata (L.) Woolly alder sawfly	Al	numerous completely defoliated clumps in and around the city of Thunder Bay
Gilpinia hercyniae (Htg.) European spruce sawfly	wS	low populations at several sample points in the Region
Micrurapteryx salicifoliella Cham. Willow leafminer	W	continued heavy damage through the eastern part of the Region
Monochamus scutellatus (Say) Whitespotted sawyer	jP	medium-to-heavy damage to fringe trees adjacent to a cutover near Tilly Lake, Thunder Bay District
Nematus salicisodoratus Dyar Willow sawfly	W	one large clump of shrubs heavily defoliated near Caribus Lake, Atikokan District
Neodiprion abietis complex Balsam fir sawfly	bF,bS, wS	reduced populations in the Atikokan District; trace populations observed at Waterhouse Lake, Thunder Bay District; small numbers found at several sample points in the Geraldton District

(continued)

Table 4. Other forest insects (concluded).

Insect	Host(s)	Remarks
Neodiprion pratti banksianae Roh. Jack pine sawfly	jP	a few colonies in Croll Twp, Geraldton District
Neodiprion virginianus complex Redheaded jack pine sawfly	jP	trace levels near English River, Thunder Bay District
Nymphalis antiopa (L.) Spiny elm caterpillar	tA,W	a few widely scattered colonies, Terrace Bay District
Phratora hudsonia Brown Birch leaf beetle	wB	small numbers, Rainbow Falls Provincial Park, Terrace Bay District
Phyllonorycter ontario (Free.) Aspen leafblotch miner	tA	reduced intensity of damage to aspen regeneration in the western part of the Region; continued high populations in some areas of the Geraldton and Terrace Bay districts
Pleroneura brunneicornis Roh. Balsam shootboring sawfly	bF	light incidence of damage at Camp 56 Rd, Nipigon District
Pseudaletia unipuncta (Haw.) Armyworm	grass	high population, causing browning of lawns at several locations in the Region
Schizura concinna (J.E. Smith) Redhumped caterpillar	wB	few small trees defoliated near Factor Lake, Atikokan District

TREE DISEASES

Major Diseases

Armillaria Root Rot, *Armillaria mellea* (Vahl : Fr.) Kummer

Low numbers of young conifers have been dying from this disease each year, most noticeably throughout regeneration areas in the Region. This year was no different, with mortality common at many points across the work area. In the Thunder Bay District, mortality levels of 2.0% and 1.3% were found in jack pine plantations along the Mack Road (30 ha) and Sawmill Bay Road (16 ha), respectively. In a 20-ha jack pine plantation at one location along Kimberly-Clark Road 15-1 in Geraldton District, a 150-tree evaluation revealed an average mortality level of 1.3%. Some of the young eastern white cedar (*Thuja occidentalis* L.) windbreak trees at the Thunder Bay Forest Nursery were infected by this fungus. Because these trees protect the compartments from the elements, and because the potential exists for spread to other trees in the row, their infection is seen as particularly serious. In an effort to inhibit its spread, OMNR staff at the Nursery removed both the affected trees and the adjacent trees, taking particular care to exhume most of the roots as well.

Spruce Needle Rusts, *Chrysomyxa ledi* (Alb. & Schw.) d By. var. *ledi*, *C. ledicola* (Peck) Lagerh.

The incidence of this foliar disease increased in 1984, particularly in the eastern part of the Region, where it was widely distributed. This rust, of which Labrador tea (*Ledum groenlandicum* Oeder) and leather leaf (*Chamaedaphne calyculata* [L.] Moench) are the alternate hosts, is not usually a serious problem. A defoliation level of 50% was observed on fringe black spruce along the edge of a semimature stand extending along Highway 625 north of Caramat, Geraldton District, and in a 50-ha plantation at Nairn Road, Terrace Bay District (Table 5). Moderate-to-heavy infections to individual trees and small clumps of white and black spruce occurred in the Drift Lake and Eaglehead-Mott lakes area, Thunder Bay District. Low infection levels were common at numerous other locations throughout the Region.

Ink Spot of Aspen, *Ciborinia whetzelii* (Seav.) Seav.

A slight increase was oberved in the amount of damage caused by this disease in the western part of the Region. The only noteworthy damage seen was 50% infection of about 2 ha within a semimature aspen stand in Devon Township, Thunder Bay District with an average defoliation level of 20%. Low and trace levels of infection were observed near Sunshine and in MacGregor Township in Thunder Bay District. No damage caused by this foliage disease was found elsewhere in the Region.

Table 5. A summary of spruce trees affected and foliage damaged by spruce needle rust in two districts in 1984 (counts based on the examination of 150 trees at each location).

Location	Area affected (ha)	Estimated trees/ha	Host	Avg ht of trees (m)	Trees infected (%)	Foliage damage (%)
Geraldton District						
Caramat	20	2,200	bS	3.0	100	50
Kimberly-Clark						
Road 15-1	20	1,600	bS	1.7	100	20
Road 17-1	10	2,200	bS	2.3	100	40
Halfway Road	10	3,000	bS	1.2	100	25
Croll Twp	1	2,200	bS	2.5	100	25
Terrace Bay District						
Davies Twp		3,000	bS	1.9	100	10
Wintering Road	10	2,200	bS	2.3	100	10
Nairn Road	50	2,200	bS	4.0	90	50
Jackfish Lake	10	1,500	wS	2.1	90	30

Tar Spot Needle Cast, *Davisomycella ampla* (J. Davis) Darker

There was a decrease in the incidence of this needle cast this year in the Region. The only noteworthy occurrence was in the Great Lakes Forest Products plantation in Paipoonge Township, Thunder Bay District, where a low infection level was found on scattered jack pine of various age classes in an open area of the plantation. Trace infection levels were observed at other points in the work area, with only individual trees affected in each stand. This disease had very little, if any, impact on jack pine in the North Central Region in 1984.

Leaf Blight, *Septoria betulae* Pass.

This foliage disease of white birch caused appreciable damage in numerous stands in the south central and southeastern portions of the Region. Usually this disease does not cause significant damage, but this year heavy infection caused leaves to turn brown, dry out and fall off the trees with foliage in the upper crown affected the most. Pockets of heavy damage, observed at various points in the southeastern Thunder Bay District, were particularly noticeable along Highway 527 near Walkinshaw Lake. Damage was also found in white birch stands in Stirling Township, Nipigon District; and along the Dead Horse Road and

Highway 17 from Terrace Bay to Marathon in Terrace Bay District. The unusually high incidence of this disease in the Region may have been a result of favorable climatic conditions during an appropriate phase of the pathogen's development.

Table 6. Other forest diseases.

Organism	Host(s)	Remarks
Ceratocystis ulmi (Buism.) C. Moreau Dutch elm disease	wE	continuing to kill trees in urban and rural areas of Thunder Bay
Coleosporium asterum (Diet.) Syd. Pine needle rust	jP	low defoliation level at one location, Thunder Bay District
Cronartium comptoniae Arth. Sweetfern blister rust	lodgepole pine	a few infected trees in a plantation in O'Meara Twp, Geraldton District
Cytospora sp. Cytospora canker	tL	high incidence of twig mortality on several large, open-grown trees in Tuuri Twp, Terrace Bay District
Dermea balsamea (Peck) Seaver Twig canker	bF	dead red-colored trees at scattered locations through the Region
Endocronartium harknessii (J.P. Moore) Y. Hirats. Western gall rust	lodgepole pine	trace infection in O'Meara Twp, Geraldton District; found commonly on jack pine throughout the Region
Gremmeniella abietina (Lagerb.) Morelet Scleroderris canker	jP	low incidence of stem infections on young plantings through the eastern part of the Region
Marssonina brunnea (Ell. and Ev.) Magnus Leaf spot	tA	a 0.5-ha pocket of moderate damage in an aspen stand along the Goldfield Road, Geraldton District
Melampsorella caryophyllacearum Schröter Fir broom rust	bF	single brooms found at widely scattered locations in the Region

(continued)

Table 6. Other forest diseases (concluded).

Organism	Host(s)	Remarks
Monilinia fructicola (Winter) Honey Brown rot	pCh	moderate-to-severe incidence of branch tip mortality on numerous trees in the Hwy 17 area, Terrace Bay District
Pucciniastrum epilobii Otth Fireweed rust	bF	trace level of infection on numerous trees, Halfway Rd area, Geraldton District
Sirococcus strobilinus Preuss Shoot blight	rP	common on understory trees at Dawson Trail Campgrounds, Atikokan District
Venturia macularis (Fr.) Müller & Arx Shoot blight	tA	pockets of light and moderate damage common in cutovers prolific with aspen regeneration, particularly in the western part of the Region

ABIOTIC DAMAGE

Frost Damage

Minimum daily temperatures in mid- and late May 1984 were below freezing for a total of 14 days as recorded by the Atmospheric Environment Service in Atikokan. The cold nights occurred just as and shortly after the aspen leafed out. Minimum temperatures were -3.2°C on 15 May and -2.5°C on 26 and 28 May. Some defoliation of trembling aspen resulted, as well as damage to the leaf edges of foliage that remained on the tree. The combination of these partially damaged leaves and the smaller new foliage created a very ragged looking tree crown. This condition was observed at scattered locations across the western Atikokan District, mainly in mature stands. Since aspen is one of the first species to foliate in the spring, it was the only one damaged. Noteworthy frost damage was not found elsewhere in the Region.

Snow Damage

Damage to various tree species, mainly conifer, resulted from very wet snow that fell during mid- to late October 1983 in the south-southeastern Nipigon District. Whole tops were broken off scattered semimature spruce and balsam fir, and broken branches were common on pine. Younger trees along open areas, such as roadways, were bent over as well. This damage, which was found scattered throughout the area south of Lake Nipigon, was particularly noticeable along Highway 585 and east into the Domtar Forest Products Limit. Broken and leaning white spruce were observed in the Limestone Management Unit, Nipigon District (see White Spruce Plantations). Some breakage and uprooted trees, resulting from similar circumstances, were also observed along roadways at various locations in the Geraldton District.

SPECIAL SURVEYS

Acid Rain National Early Warning System

Because of concern over the possible impact acid rain may have on trees, monitoring plots have been established across the province. Two 40-m^2 plots have been established in the North Central Region. These were located in a black spruce stand within the Ontario Ministry of the Environment study area near Hawkeye Lake in Fowler Township, Thunder Bay District, and in a white spruce working group east of the Gravel River in Wiggins Township, Terrace Bay District. Both stands are in the semimature age class. Baseline data were gathered about the physical, chemical and biological state of the plots, and changes in this state will be recorded.

Hypoxylon Canker Survey

As part of an ongoing effort to monitor pest levels, a special survey of Hypoxylon canker, *Hypoxylon mammatum* (Wahl.) J.H. Miller, was carried out in 1984. Fourteen trembling aspen stands between the ages of 25 and 60 years were examined across the Region (Table 7). Four of these locations were established as study plots to be examined again. This disease can be found in most stands but seldom at very high levels. Stem canker infection levels of 3% were found in Ashmore and Oakes townships, Geraldton District, and 2% mortality was recorded in Oakes township. Cankers on tree branches were observed on 1% of the trees in Ware Township, Thunder Bay District (see photo page). When stem cankers are present tree mortality does not always occur, particularly if the canker is above live branches. Crown dieback will result but often lower branches will survive the infection and only the tree form is affected. When infection is lower on the trunk, mortality usually results and the tree is also very susceptible to breakage.

Pinewood Nematode, *Bursaphelenchus xylophilus* (Steiner & Buhrer) Nickle

The pinewood nematode is known to cause a wilting disease in many pine species, balsam fir (*Abies balsamea* (L.) Mill.) and probably other conifer species that are host to the beetle vectors. The nematodes are transferred from infested to healthy trees by longhorn beetles, *Coleoptera: Cerambycidae*. The nematodes stress the tree by rapidly multiplying in the sapwood of branches and main stems, thereby disrupting the nutrient flow within the tree. There is reason to believe that nematodes are not the primary cause of tree mortality, but a contributing factor along with various forest insects and diseases. Suspect trees have been sampled in the North Central Region since 1980 and no pinewood nematodes have been found in any of the samples.

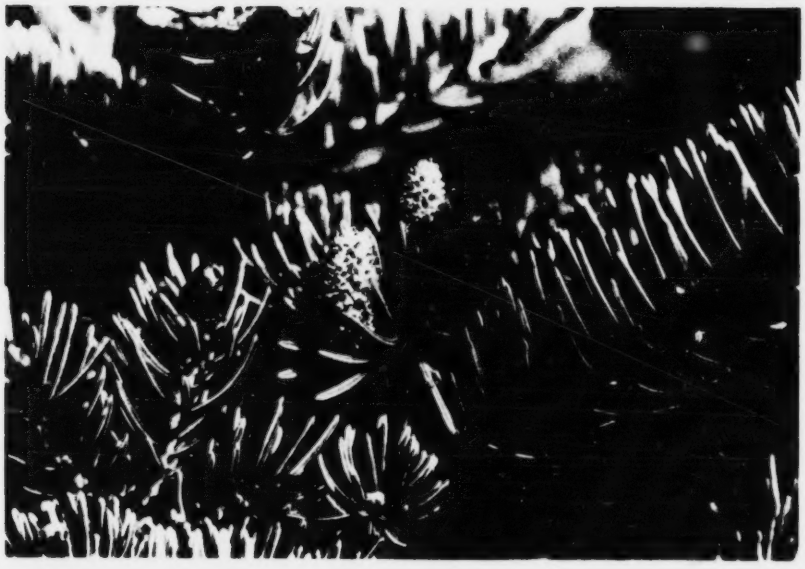
Table 7. A summary of damage caused by Hypoxylon canker detected in a special survey of trembling aspen in the North Central Region (percentages based on the examination of 150 trees at each location).

Location	Area affected (ha)	Avg ht of trees (m)	Avg DBH of trees (cm)	Trees diseased		
				Branch cankers (%)	Stem cankers (%)	Mortality (%)
Geraldton District						
Ashmore Twp[a]	10	16.2	14	0	3	1
Exton Twp	20	16.0	14	0	1	1
Fulford Twp	10	23.0	25	0	0	0
K-C Road 23	10	14.0	14	0	1	0
Lukinto Lake	10	12.0	11	0	0	0
Oakes Twp[a]	10	14.5	13	0	3	2
Rupert Twp	20	25.0	23	0	0	1
Nipigon District						
Stirling Twp	20	19.7	16	0	0	0
Walters Twp	10	16.0	14	0	0	1
Terrace Bay District						
Patience Twp	10	12.0	15	0	1	1
Thunder Bay District						
Blackwell Twp[a]	20	19.3	23	0	1	0
Blake Twp	10	18.5	20	0	0	0
Devon Twp[a]	10	23.0	20	0	1	0
Ware Twp	15	11.7	18	1	1	0

[a] Study plots

A trembling aspen (*Populus tremuloides* Michx.) tree with the stem infected by Hypoxylon canker, *Hypoxylon mammatum* (Wahl.) J.H. Miller

Advanced root rot infection which has caused breakage of a black spruce (*Picea mariana* [Mill.] B.S.P.) tree



Healthy male and female flowers of white spruce (*Picea glauca* [Moench] Voss)

White spruce cones damaged by spruce cone rust, *Chrysomyxa pirolata* Wint.

Root Rot of Black Spruce

Various upland and lowland mature black spruce stands were examined for the presence of root rot (see photo page) in the three eastern districts of the Region. At each site, increment cores were taken from 25 trees at 15 cm above ground and examined for the presence of stain and/or decay. Studies by Dr. R.D. Whitney of the Great Lakes Forest Research Centre, Sault Ste. Marie, Ont., show that the area of decay at this height is a good indication of the amount of root damage. A disc was also taken from each of two affected trees and submitted for laboratory analysis. The average amount of rot found at each site is summarized in Table 8. The only damaging pathogen isolated from samples submitted was the root and butt rot, *Inonotus tomentosus* (Fr.) Gilb. Other diseases were present but only those causing a stain or rot of dead wood were recorded.

Table 8. A summary of the black spruce root rot survey in three districts in the North Central Region (data based on the examination of 25 trees at each location).

Location	Avg DBH of trees (cm)	Avg tree age	Basal area host species (m^2/ha)	Site	Trees affected (%)	Avg amount of rot at 15 cm (%)
Geraldton District						
Croll Twp	16	150	27	lowland	48	12
Hwy 11 - Flynne Lake	17	120	19	upland	12	3
Nipigon District						
Corrigal Twp	13	130	21	upland	12	5
Pifher Twp	11	150	17	lowland	56	10
Terrace Bay District						
Hwy 614 - Dorothy Creek	13	100	21	upland	20	10

Semipermanent Jack Pine Plots

These sample plots were established in 1982. The total height growth from that time has averaged 1.0 m for the four plots. Most of the damage levels increased from last year, with the exception of tip beetle; northern pitch twig moth, *Petrova albicapitana* (Busck.); Scleroderris canker; and needle cast, *Lophoderium* spp.

Eastern pine shoot borer and white pine weevil, insects that attack tree leaders, were observed less frequently but at higher levels

when found (Table 9). The most damage was caused by Armillaria root rot; a mortality level of 4% was found at the Mack Road plantation. Gall rust and Scleroderris canker were present in some plantations with most of the damage confined to branches rather than the main stems. Needle cast infection levels were at trace levels at the site on the Lukinto Lake Road. These plots will be examined again in 1985, probably for the last time in conjunction with this special survey.

White Spruce Plantations

Special plantation surveys were started in 1979. This is the second time white spruce has been examined in the North Central Region. Twelve plantations of varying age classes ranging from 8 to 25 years old were visited twice during the course of this summer's field season (Fig. 4). The major insect, disease and abiotic problems encountered at each sample location are summarized in Table 10. Increased spruce budworm damage was the most notable change since white spruce was last surveyed in 1981. This is consistent with continual population increases in many areas of the Region. In contrast, there was a decrease in the amount of *Zeiraphera* sp. and spruce bud midge, *Rhabdophaga swainei* Felt, found this year. All other pest levels were much the same as those found in 1981.

Spruce budworm (see photo page) was certainly the most damaging pest found in the trees examined, with all but one plantation infested. Defoliation of current foliage reached levels as high as 91%. Yellow-headed spruce sawfly and *Zeiraphera* sp. were found only at one site, and white pine weevil was observed at two locations (Table 10). Spruce bud midge infested 11% and 14% of the sample trees in McCaul and Devon townships, respectively. Aphids, *Cinara* sp., were found on 27% of the trees in Fernow Township.

The most common disease present on the sample trees was spruce needle rust, with an average defoliation level of 20% at one location (Table 10). Spruce cone rust, *Chrysomyxa pirolata* Wint., was also present in Ledger Township, but at negligible levels. Frost damage was found at two plantations but actual foliage damaged was only 1%. Heavy wet snow bent over 7% and 1% of the evaluated trees in the two plots in Ledger Township, breaking 2% of the tops of the taller trees.

Table 9. A summary of insect and disease damage in a special survey of jack pine in the North Central Region in 1984 (percentages based on the examination of 300 trees at each location).

Location	Avg ht of trees (m)	Plantation area (ha)	Estimated trees/ha	Eastern pine shoot borer	White pine weevil	Armillaria root rot	Gall rust		Scleroderris canker	Needle Cast	
				Leaders attacked (%)	Leaders attacked (%)	Trees affected (%)	Trees affected (%)	Severely galled (%)	Trees affected (%)	Trees affected (%)	Defoliation (%)
Geraldton District											
Lukinto Lake Rd	1.8	50	2,500	0	0	1	3	1	23	1	1
Nipigon District											
Sturgeon River	1.9	20	2,500	0	1	0	0	0	0	0	0
Thunder Bay District											
East Bay	2.2	61	4,500	0	0	4	1	0	0	0	0
Mack Rd	1.9	14	4,300	4	6	2	1	1	0	0	0

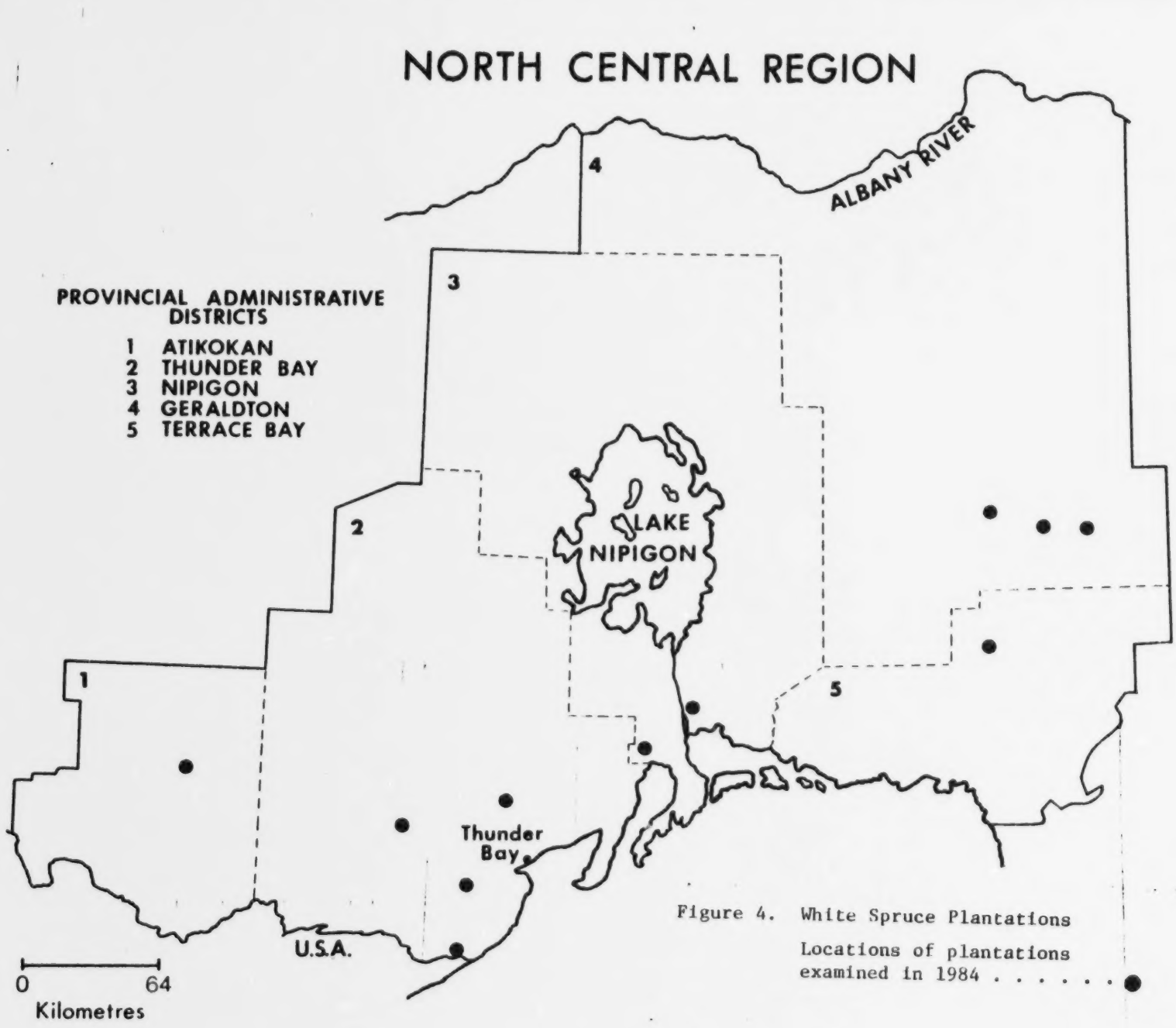


Figure 4. White Spruce Plantations

Locations of plantations examined in 1984 . . . . . .

Table 10. A summary of insect, disease and abiotic damage detected in a special survey of high-value white spruce in the North Central Region (percentages based on the examination of 150 trees at each location).

Location	Avg ht of trees (m)	Plantation area (ha)	Estimated trees/ha	Spruce shootworms	Spruce budworm		Yellowheaded spruce sawfly		White pine weevil	Frost		Spruce needle rust	
				Trees attacked (%)	Trees attacked (%)	Defoliation (%)	Trees attacked (%)	Defoliation (%)	Leaders attacked (%)	Trees attacked (%)	Defoliation (%)	Trees attacked (%)	Defoliation (%)
Atikokan District													
McCaul Twp	1.0	19	2,500	0	35	1	0	0	0	32	1	0	0
Geraldton District													
Fernow Twp	1.2	10	2,990	0	0	0	0	0	0	0	0	0	0
Klotz Lake	3.2	10	1,680	0	100	5	0	0	0	0	0	0	0
Pagwachuan SPA[a]	2.6	5	2,000	0	100	30	0	0	0	0	0	0	0
Nipigon District													
Ledger Twp	1.8	10	1,600	6	7	2	0	0	1	0	0	100	2
Ledger Twp	4.8	10	2,000	0	29	3	0	0	0	0	0	0	0
Stirling Twp	4.2	20	2,500	0	77	1	0	0	0	0	0	62	1
Terrace Bay District													
Davies Twp	1.2	10	2,900	0	52	5	0	0	1	0	0	84	20
Thunder Bay District													
Devon Twp	1.6	26	4,300	0	31	1	2	2	0	53	1	0	0
Fowler Twp	9.6	5	4,200	0	100	81	0	0	0	0	0	0	0
Hagey Twp	5.2	18	4,200	0	100	91	0	0	0	0	0	0	0
Marks Twp	6.3	20	4,200	0	100	10	0	0	0	0	0	0	0

[a] SPA = Seed production area

White Spruce, Flower, Cone and Seed Survey

In 1984 there was a good crop of cones on white spruce in the North Central Region. Samples of the late flowering stage were taken from two locations in the Region. In the Thunder Bay District a sample of female white spruce flowers (see photo page) taken at the Matawin Seed Orchard showed 44% of the sampled flowers to be damaged. The other collection was taken at a point along the Lemay Road near Camp 15 in Terrace Bay District, and 85% of this sample was damaged. Both locations were within an area of spruce budworm infestation, and this insect was the principal cause of the damage found.

A second sample was taken when the cones had matured, just prior to picking time. The same two locations were resampled, and two new locations were added. One of the two new locations, the Kimberly-Clark SPA, Geraldton District, was outside the spruce budworm infestation area. Nevertheless, 76% of the cones were damaged, mainly by the eastern blackheaded budworm. At the other three locations, within the spruce budworm infestation, that pest was, as expected, the cause of greatest cone damage. The spruce cone maggot, *Hylemya anthracina* (Czerny) and the spruce cone axis midge, *Dasineura rachiphaga* Tripp, were the two insects most damaging to the seeds. Spruce cone rust (see photo page) damaged some of the cones at the O'Connor Seed Orchard. Table 11 summarizes the data collected at the four locations where cones were sampled.

Climatic Data

Extremes in the various meteorological phenomena can have an impact on the forest. The atmospheric conditions that have the most potential to cause damage to trees are temperature, precipitation and wind. Table 12 lists monthly mean temperatures and total precipitation for 1984 from two locations in the Region, with the deviation from a 30-year normal. Whenever possible, weather-related damage is surveyed as it occurs and is included as a separate entry under "Abiotic Damage" in this report.

Table 11. A summary of a special survey of white spruce seed and cone pests at four locations in the North Central Region in 1984 (percentages based on the examination of 100 cones at each location).

Location	Damaged cones (%)	Seed loss within damaged cones (%)	Cone pests and percentage of the damaged cones affected
Geraldton District			
Kimberly-Clark SPA[a]	54	34	Lepidopterous larvae - 76 Spruce cone maggot - 24
Terrace Bay District			
Lemay Rd - Camp 15	100	87	Lepidopterous larvae[b] - 99 Spruce coneworm - 1
Thunder Bay District			
Matawin Seed Orchard	75	37	Lepidopterous larvae[b] - 76 Spruce cone maggot - 15 Spruce cone axis midge - 8 Spruce cone rust - 1
O'Connor Seed Orchard	47	29	Lepidopterous larvae[b] - 67 Spruce cone rust - 24 Spruce seed moth - 2

[a] SPA = Seed production area
[b] predominantly spruce budworm

Table 12. A summary of temperature and precipitation for 1984 from two locations in the North Central Region.

Location	Month	Mean temperature (°C)		Deviation from normal (°C)	Total precipitation (mm)		Deviation from normal (%)
		Actual	Normal		Actual	Normal	
Geraldton Airport	January	-22.2	-20.0	-2.2	42.5	38.2	+11
	February	- 9.5	-17.9	+8.4	28.6	33.3	-14
	March	-13.2	-11.0	-2.2	34.8	38.2	- 9
	April	3.8	- 0.5	+4.3	38.0	43.3	-12
	May	7.1	7.7	-0.6	57.4	63.2	- 9
	June	14.3	13.5	+0.8	142.1	91.9	+55
	July	17.5	16.3	+1.2	111.9	81.6	+37
	August	17.4	14.6	+2.8	92.6	66.8	+39
	September	8.6	9.3	-0.7	66.2	75.6	-12
	October	6.0	3.9	+2.1	52.8	64.6	-18
	November	-4.2	- 5.5	+1.3	73.4	61.5	+19
	December	-15.5	-15.4	-0.1	106.3	38.8	+174
Thunder Bay Airport	January	-16.4	-15.4	-1.0	20.9	40.9	-49
	February	- 5.4	-13.0	+7.6	32.4	28.3	+14
	March	-8.1	-6.3	-1.8	15.7	45.0	-65
	April	5.3	2.5	+2.8	26.5	50.7	-48
	May	8.7	8.8	-0.1	51.7	73.3	-29
	June	14.1	14.0	+0.1	120.7	76.6	+58
	July	18.2	17.6	+0.6	97.0	75.4	+29
	August	18.0	16.4	+1.6	86.5	83.1	+ 4
	September	10.3	11.1	-0.8	46.5	89.1	-48
	October	6.6	5.7	+0.9	82.6	54.8	+51
	November	- 2.1	- 2.6	+0.5	32.1	52.9	-39
	December	-10.8	-11.1	+0.3	71.0	41.7	+70

[a] Data from the Atmospheric Environment Service